

**REMARKS**

**Status of Claims**

Claims 1, 3, 6-7 and 11-13 are pending, of which claim 1 is an active independent claim.

Claims 1, 3, 6 and 7 have been amended to correct informalities in the claim language and to more clearly define the claimed subject matter. Claims 2, 4-5 and 8-10 have been cancelled without prejudice or disclaimer of the subject matter thereof. Claim 13 has been added. Support for the amendment and new claim is found, for example, at FIG. 2 and paragraphs [0104] and [0126] of the publication US 2008/0105906 of the present application. No new matter has been entered.

**Objection to the Drawings**

The Examiner objected to the drawings because the drawings allegedly fail to show the subject matter of claim 8. Since claim 8 has been cancelled, Applicant respectfully requests that the Examiner withdraw the objection to the drawings.

**Claim Rejection – 35 U.S.C. § 103**

Claims 1, 3, 11, and 12 were rejected under 35 U.S.C. § 103 as being unpatentable over Yoshiko (JP 2004-039832). Claims 6 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoshiko as applied to claim 1, and further in view of Seo (US 2004/0048444). Claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoshiko in view of Williams et al. (USP 6,900,091). Claims 9 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoshiko in view of Williams as applied to claim 8, and further in view of Lee (US 2004/0127035). These rejections are respectfully traversed for at least the following reasons.

Amended claim 1 now recites, among other features, that the isolation region is made of a silicon film and a depth of the first semiconductor layer is substantially the same as that of the second silicon layer. Applicants respectfully submit that, at a minimum, none of the cited references disclose or suggest these elements of claim 1.

The Examiner asserts that the STI element separation structure 7b of Yoshiko corresponds to the claimed isolation region. However, the STI structure 7b of Yoshiko is made of silicon oxide (see, paragraphs [0029]-[0030] of Yoshiko), but not a *silicon film*. In rejecting claim 7, the Examiner further asserts that Seo discloses porous silicon. However, the porous layer 210 of Seo is an oxidized porous silicon layer, i.e., a silicon oxide layer (see, abstract of Seo), but not a porous *silicon film*. Similarly, Lee discloses an oxidized porous silicon layer (see, abstract of Lee). As such, none of the cited references disclose or suggest the isolation region being made of a silicon film.

The present subject matter can prevent stress-induced defects in the photoelectric conversion section during heat processes by making the thermal expansion coefficient of the silicon substrate equal to the isolation region made by using a silicon film. Yoshiko, or other cited references, fails to recognize or suggest this issue relating to the stress-induced defects due to the difference of the thermal expansion coefficients between the isolation region and the silicon substrate. Therefore, there is no motivation or suggestion to combine Yoshiko with any of the other cited references.

Further, Applicants respectfully submit that none of the cited references disclose or suggest that the depth of the first semiconductor layer is substantially the same as that of the *second* silicon layer, as recited by amended claim 1. With this structure, the first semiconductor layer can have a depth lower than the first silicon layer surrounding the isolation region, which

results in reducing damages to the semiconductor substrate during the etching of the trench. Furthermore, the damages caused in the corner of the trench due to thermal stress can be reduced during the heat treatment.

In contrast, Yoshiko discloses that the N-type silicon layer 18 (i.e., the alleged first semiconductor layer) has substantially the same depth as the P<sup>+</sup>-type channel stopper layer 6 (i.e., the alleged first silicon layer). Accordingly, Yoshiko fails to disclose the above identified structure of claim 1 and would not have the properties associated with this structure. It is noted that none of the other cited references cures this deficiency of Yoshiko.

As such, it is clear that none of the cited references, taken alone or in any combination thereof, renders claim 1 and any claim dependent thereon obvious. Thus, Applicants respectfully request that the Examiner withdraw the rejections of claims 1, 3, 6-7 and 11-12 under 35 U.S.C. § 103(a).

#### **New Claim**

Since new claim 13 depends upon claim 1, this claim is patentable for at least the same reasons as claim 1. Further, none of the cited references disclose the elements of claim 13, claim 13 is patentable for its own merit in addition to the dependency upon claim 1.

**CONCLUSION**

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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